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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/768,494	01/24/2001	Peter C. Van Buskirk	2771-272	2111

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EXAMINER

OLSEN, ALLAN W

ART UNIT	PAPER NUMBER
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1746

DATE MAILED: 05/22/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/768,494

Applicant(s)

BUSKIRK ET AL.

Examiner

Allan W. Olsen

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 06 March 2002.
- 2a) ☐ This action is **FINAL**.
- 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-4, 12-14, 24-27, 53, 57 and 58 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-4, 12-14, 24-27, 53, 57 and 58 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Claim Objections

Claim 25 is objected to because a Lewis base adduct is recited as a possible cleaning enhancement agent. The examiner believes the limitation should be directed to a Lewis base, rather than a Lewis base adduct. The specification describes a process in which a cleaning enhancement agent (e.g. CO, PF₃, PR₃) is added to a cleaning gas to remove a noble metal residue. These agents are classic Lewis bases with π -backbonding abilities. The cleaning is enhanced by these agents because the Lewis base forms an adduct with a metal atom in the residue and thereby increases the volatility of the noble metal residue. In order for the cleaning enhancement agent to function it must be available as a Lewis base so that it may form an adduct with the residue. It must not be bound as a pre-formed adduct.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claim 27 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the use of agents such as CO, PF₃ or P(alkyl)₃ (i.e. classic Lewis base, π -back-bonding ligands), does not reasonably provide enablement for an iridium halide species (Ir(X)₁₋₆) serving as a cleaning enhancement agent. For example, on page 11, the specification teaches that CO may be used to assist in the volatilization of Ir(X)₁₋₆ by forming Ir carbonyl compounds, Ir(CO)_y(X)₁₋₆. In this teaching the Ir(X)₁₋₆ is the product of a reaction between an Ir residue and a reactive halide composition that includes CO as a cleaning enhancement agent. The Ir(X)₁₋₆ is not an agent used for contacting the Ir to assist in volatilizing the residue, It is, rather, the product of a reaction between the iridium residue that has been contacted with a reactive halide composition that included CO as the cleaning enhancement agent.

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The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claim 24 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 24 recites "...and the cleaning gas...". There is insufficient antecedent basis for this limitation.

Claim 24 recites "...at least one gas phase reactive halides species selected from the group consisting of SF₆, SiF₄, Si₂F₆ and SiF₂ and SiF₃ radicals...". This is an improper recitation of a Markush group because using the word "and" twice opens the door to several different claim interpretations.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

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Claims 3, 4, 13, 14 and 57 are rejected under 35 U.S.C. 102(b) as being anticipated by US 5,814,238 (Ashby et al., hereafter, Ashby).

Ashby teaches a method for removing contaminants of Pt, Pd, Ir and Rh from the surface of a wafer that uses a gas phase reactive halide composition. Ashby teaches the use of SF₆ as a component of the reactive halide composition. See: col. 1, lines 10-16 and col. 4, lines 4, 5 and 62. Ashby teaches the removal of metal/metal silicides in a fluorine plasma environment. In this environment the claimed metal fluorides and the SiF_x species, including radicals, would inherently be present (col. 7, line 45-67). Ashby teaches the use of a cleaning enhancement agent/Lewis base (e.g. PF₃, CO, PR₃) (abstract; col. 3, line 26 - col. 5, line 8).

Claims 2-4, 12-14 and 57 are rejected under 35 U.S.C. 102(e) as being anticipated by US 5,911,887 (Smith et al., hereafter, Smith).

Smith teaches a method that uses a gas phase reactive halide composition for removing Pt from a wafer's surface (col. 1, lines 58-65). As a reactive halide Smith teaches the use of XeF₂ (col. 5, line 60). As a reactive halide Smith teaches the use of SF₆ (col. 5, line 60). Smith teaches removing Pt in the presence of silicon. Reactions of Si between fluorine atoms generated from XeF₂, or between species of a fluorine plasma environment, would inherently generate the claimed SiF_x and SiF_x radicals (col. 3, ln 13-18; col. 5, ln 38-47). Smith teaches the use of a cleaning enhancement agent/Lewis base (e.g. PF₃, CO) (col. 5, lines 5, 58-60).

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Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 2, 53, 57 and 58 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 13 and 20 of U.S. Patent No. 6,254,792. Although the conflicting claims are not identical, they are not patentably distinct from each other because the preamble of the instant claims state that the invention is directed to a method of removing iridium residue from a microelectronic device structure whereas the preamble of the patent claim states that the invention is directed to a method of making an iridium based structure on a substrate. The patent claim accomplishes the preamble's directive by etching an iridium layer with the same reactive gas (i.e. XeF₂ and one of CO, PF₃ and PR₃) as the instant claims use etch away an iridium residue.

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Claims 2, 57 and 58 are rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 5, 12-14 and 20 of U.S. Patent No. 6,143,191. Although the conflicting claims are not identical, they are not patentably distinct from each other because the preamble of the instant claims state that the invention is directed to a method of removing iridium residue from a microelectronic device structure whereas the preambles of the patent claims state that the inventions are directed to methods of making an iridium based structure on a substrate. The patent claims accomplish the directive of their preamble by etching an iridium layer with the same reactive gas (i.e. XeF₂ and one of CO, PF₃ and PR₃) as the instant claims use to etch away an iridium residue.

Claims 2-4, 12-14, 24-27, 53, 57 and 58 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-6, 8-10, 12-17, 21-23, 25,26, 28, 29, 31-33 and 35-51 of copending Application No. 09/874102. Although the conflicting claims are not identical, they are not patentably distinct from each other because each limitation of the instant claims are claimed in the copending Application No. 09/874102, the only difference being that Application No. 09/874102 recites additional limitations such as the inclusion of oxygen or ozone in the reactive gas.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

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Allowable Subject Matter

The indicated allowability of claim 53 is withdrawn in view of the above double patenting rejections.

Claims 24-27, 53 and 58 are allowable over the prior art but they stand rejected under the judicially created doctrine of obviousness-type double patenting. The obvious type double patenting rejections may be overcome by the filing necessary terminal disclaimers. Additionally, claims 24-27 are dependent upon a rejected base claim and claims 24 and 27 are rejected under 35 U.S.C. 112.

The following is a statement of reasons for the indication of allowable subject matter: The etching of Iridium with XeF₂ constitutes novel and non-obvious subject matter over the references of record that are available as prior art.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Vaartstra pertains to very related subject matter, however, it does not constitute prior art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allan Olsen whose telephone number is 703-306-9075. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Randy Gulakowski, can be reached on 703-308-4333. The examiner's Right-Fax (fax direct to examiner's desktop) phone number is 703-872-9684. Alternatively, the general fax numbers for TC1700 are 703-872-9310 (non-after finals) and 703-872-9311 (after-final).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0661.

Allan Olsen, Ph.D.
May 10, 2002

